DATA PROCESSING DIGEST

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Programing

THE IMPORTANCE OF PROGRAM MAINTENANCE

John Boccomino, Ford Motor Company
SYSTEMS AND PROCEDURES, August 1957; pages 9-14.

The forgotten area of systems design and programing is the vast maintenance job which goes on constantly after the original system has begun working. Such maintenance includes undetected program errors, incorrect input data, new situations, fuller utilization of the computer, and changing aspects of the programed applications.

Errors which were inadvertently programed into the system sometimes do not show up until a series of transactions produces a situation which has not been provided for, or which causes an error indication. Sometimes the check-back is an involved and lengthy process, and the cause of the error may be buried deep in the system logic. In the case of incorrect input data, programing may be planned in the early stages to perform machine edits on input data, or to detect and by-pass errors. Sometimes a tighter control on clerical operations originating the data will remedy the trouble.

When a new situation is introduced into the system, parts of the program may be affected. If this is not anticipated, errors may result. For example, a new Ford plant had pay rates which did not fall within the rate limits established in the payroll program. This caused the computer to print out pages of rate error notices, a comparatively minor mishap which illustrates, however, the possible consequences of such an oversight.

Continuous revision of programs will be made in order to use the computer more efficiently, or to tie in new applications. Such revisions may be the simple addition or insertion of a few instructions, or complete new programs inserted into a lengthy operation. Some applications, such as payroll, will always be in a state of revision because of union negotiations, changes in benefits or insurance rates or tax rates. The Ford Motor Company had 3550 changes or additions in its payroll programs in one year, an increase of 20% in the payroll processing program, and an increase of 23 percent in the payroll file maintenance program.

"Although program maintenance and system follow-up activity is generally a forgotten area, it has proven to be a full time job."

CONTENTS

A SIMPLIFIED SYSTEM FOR THE USE OF AN AUTOMATIC CALCULATOR

David Mace and Joyce Alsop, Watson Scientific Computing Laboratory
Published by International Business Machines Corporation

A quick programing course on the IBM 650

This excellent pamphlet was developed by the Watson Scientific Computing Laboratory (a part of IBM) to teach a simplified method of using the IBM 650 computer, so as to enable classes and research groups at Columbia University to use the equipment. A somewhat simplified system of coding has been developed, using only 13 basic machine instructions (out of the 650's total list 44). When used with the interpretive routines developed as a part of the system, the method allows the beginner to solve problems of moderate size and complexity. Three one-hour sessions of formal discussion, each preceded by one or two hours of home preparation, are considered sufficient for the student to learn the system and to be ready to undertake a problem of moderate complexity.

The pamphlet (only 76 pages in length), presents the concept of the basic form in problem flow charting with remarkable clarity. Precision and scaling considerations are described briefly but well. And the chapter on program testing is excellent.

Examples referred to are mathematical in nature (e.g. computing the sines of angles), but should not cause too much difficulty for the non-mathematician. While some of the difficulties of scaling and precision that arise in mathematical problems are not as severe in business data processing, still they do occur and good programing staffs should be aware of the considerations. This pamphlet should help the beginner to understand these problems.

For information on obtaining a copy, write to IBM Corporation, 590 Madison Avenue, New York 22, N.Y.

Management Decision-making Techniques

PROCEEDINGS OF THE CONFERENCE ON OPERATIONS RESEARCH, COMPUTERS, AND MANAGEMENT DECISIONS

Published by Operations Research Group, Case Institute of Technology, Cleveland, Ohio. 1957. $5.00

A three-day conference was held at Case Institute January 30, 31, and February 1, 1957. The theme was the use of operations research in the design of data processing systems for solving management problems. The intent of the conference comes through unusually well in the proceedings. Operations research is viewed, in the first paper by J. F. McCloskey, as being the integrating agent of a large number of systems research activities. The papers in general, view electronic computers as a tool of the operations researcher in solving management problems, and operations research as a tool in designing and EDP system.

Probably the outstanding paper is the case study of the integrated process control system at the Cummins Engine Company. This detailed report relates the steps by which the operations research team analyzed the company's old inventory and production control system, diagnosed the trouble, and designed a new integrated system for streamlined control.

Integrated process control system

"An analysis of the material control, production scheduling, and engine scheduling systems revealed...[that]...the three systems, although functionally interrelated, were being operated quite independently of each other...[and]...the production control system was not formally organized."

The team rephrased the problems into the following terms:

1. Redesign the process control system involving the areas of (a) Sales Order Processing and (b) Material Control and Production Scheduling of parts and engines.

2. Develop mathematical procedures for production scheduling and inventory control.

To bring the sales order processing system into a form specified by the model which the team designed, they began developing new field applications and price manuals to help dealers write accurate, more complete, and clearer sales orders. At the plant, the order-interpreting and specification-writing functions were combined, eliminating delays and duplication of effort. They then established a reference file, showing all combinations of parts which could be used in a given type of engine. This eliminated the frequent cases in which special parts were designed because the order writers and applications engineers were unaware that alternative parts existed. The informa-

tion from the sales order processing function was then exploded for parts information in the Data Processing Center. The requirements for like parts from all engine orders are then summarized and used in the production control system. This system was reduced to routine decisions and arithmetic operations to the extent that clerical attention is necessary only for those parts requiring action. This results in guaranteeing that "the small percentage of parts constituting a large percentage of the dollar volume of sales will be given proper emphasis."

In the engine scheduling function, three steps were taken:

1. As a customer order for engines is received, the engine scheduler assigns a tentative engine assembly month based upon the customer's requested date of delivery and upon the number of firm orders on hand.

Scheduling four weeks ahead

2. Each week, the engine scheduler sets a tentative weekly engine assembly schedule for the fourth week hence. Major component schedules are then derived from this fourth-week schedule and are issued to the foremen concerned on all parts specifically machined to order.

3. Daily, a firm engine assembly schedule is set for the eighth working day hence. From this schedule, sub-assembly schedules are set and the inventory charge-off for individual parts is determined.

In inventory control, the total inventory was separated into the categories of raw material, in-process inventory, available finished parts inventory, and engine inventory. Protective cushions have been reduced through close control over vendor delivery schedules and by forecasting parts requirements. Formulas for computing reorder levels have been developed based upon the estimated demand during the lead time period, the unit cost of inventory, and the unit cost of shortage.

An interesting aspect of the study is that it was only after certain data needs were established that the team considered the inclusion of an electronic computing system as a part of the system. The computer is used to provide vendor schedules, machining schedules, raw inventory reports, and finished inventory and requirements reports. Two Appendices are included with this case study which demonstrate the inventory problem and economic purchase quantity principles.

Other case studies include product allocation among a number of plants, and empty freight car distribution. The use of computers in road building is the subject of another paper. The author suggests that an EDP system can be of great value in both the engineering and the policy-decision aspects of highway construction. Examples of each of these uses are given: the cut-and-fill operation, and construction scheduling.

The proceedings are well written and carefully produced, and should be of value to systems engineers and top management alike.

Equipment

MULTIPLE-ADDRESS MAGNETIC-TAPE TRANSPORT

George E. Comstock, Potter Instrument Co.
INSTRUMENTS AND AUTOMATION, September 1957; pages 1725-1728.

Ten separate 500' magnetic tapes are suspended in ten racks. Each tape has its own read-write 14-track heads. Each tape stores 2,400,000 seven-bit characters. Individual tape transport mechanisms move each tape at up to 100" per second. Look-up time is about 7 seconds.

SHEPARD LABORATORIES HIGH SPEED TYPER

The High Speed "Typer" produces hard copy from the output of an electronic computer or magnetic tape. Typing rates are available up to 108,000 characters per minute. Pre-punched flat folded forms are used. Printing width is 120 columns, 10 per inch. Characters available are: 26 alphabetic, 10 digits, 28 special signs and punctuation marks, or to specifications.

IBM 705 III

The new IBM 705 III has a 40,000 position magnetic core memory, which may be enlarged to 80,000 positions by use of an additional core storage unit. Simplified programing techniques have been incorporated into the design. The magnetic tape unit is completely transistorized, and reads or writes at the rate of 60,000 characters per second. The 767 Data Synchronizer is used with the system to enable the computer to read, compute and write simultaneously. The computer is expected to be particularly adaptable to low activity, high volume file maintenance applications such as inventory control, life insurance, and freight car record processing. The system will rent for $35,000 a month and up, or sell for $1,925,000 and up, depending upon the amount of auxiliary equipment used.

PRIVATE LINE CHANNELS FOR DATA TRANSMISSION

The American Telephone and Telegraph Company has offered a new service which provides private line channels for transmission of data signals. These channels, which are similar to those used for teletypewriter and telephone service, are especially adapted for transmitting signals generated from data processing equipment provided by the customer. The channel speeds range from 45 to 1600 "bits" a second.

Applications

DEPARTMENTAL RESULTS—WE GET THEM FROM OUR COMPUTER

Donald J. Coppotelli, General Electric Company, Schenectady, N. Y.
N.A.A. BULLETIN, September 1957; pages 55-61.

Integrated accounting system is tried in small department

General Electric is using an IBM 702 computer, not only for high volume jobs such as payroll, but also to process the complete financial data for one small department. This is a prototype system for integration through the use of computers. In this department there are more than 100 people receiving reports in sixteen sections. Accounting records are maintained for over 8000 shop orders and accounts on one reel of magnetic tape. There are 4000 labor and 7000 other financial transactions per week.

The system was developed around several basic concepts: automatic payment to vendors, weekly shop status reports, automatic monthly billing, complete accountability at the foreman and line-supervisor level. (Inventory was small in this department and inventory control was not mechanized.)

The master file is sequenced so that the preparation of reports can be done without sorting. Each shop record contains "indicative" data such as requisition number; budget data; and "statistical" data, such as current-month accumulation of charges by classification of the charge (various labor classes, material, overhead, etc.). Year and total-to-date amounts are accumulated by these classes separately. Unbilled balances are also maintained for each shop order and account.

In this system journal entries have been replaced by transaction records on punched cards. The computer posts all details affecting an individual record at the same time. Transaction codes replace journal entry numbers.

In the first weekly run the transaction data on cards and labor cost data (from a previous payroll run) are combined to form a consolidated transaction tape. In the second weekly run the shop order and purchase order master files are up-dated and various reports are prepared, such as: shop status, labor performance, vendor payment card, accounts payable checks, open purchase order register, etc. In this run "the transaction code tells the computer what changes need be made in the shop order master file or updates the purchase order master file or specifies the reports into which the detail card must be incorporated or establishes any special accumulations which are to be accomplished for control purposes."

In the monthly run, the shop order and account master tape is summarized to develop sub-ledger registers, overhead expense

reports, billing (mostly to other GE departments), and the general ledger.

With this system books are closed on Tuesday following the end of the month, on an actual basis. More timely billing and expense reports are available now, and management by exception is possible in regard to which shop orders are reported on, and in comparing actual to budged expenses.

((DPD hopes that this General Electric group will publish a more detailed write-up of this interesting system.))

MUCH "SOUL SEARCHING" INVOLVED IN APPLYING EDP TO CREDIT FUNCTION

Chester A. Swanson, Proctor and Gamble Company, Cincinnati, Ohio
COMPUTERS AND AUTOMATION, August 1957; pages 11, 12.

Studies by P. & G. have indicated both short term and long term programs for using EDP in the credit function. In the short term program, routine clerical tasks would be converted to electronics. These would include COD order identification and release for shipment; and credit release of orders for customers having approved credit limits. In the latter instance, credit approval would be dependent upon a limit set per order by credit personnel. "In the short term approach, the credit department would be affected only in that full reliance can be placed on the accuracy with which the computer system will identify COD orders or will determine that an order does or does not fall within the pre-determined limit. Control of the credit work would remain... in the credit department."

Credit limits may be checked automatically

The long term program would include electronic comparison of order quantities with predetermined limits, recognizing outstanding debts and unshipped orders. An order which fell outside the limits would be referred to the credit department in either or both of these ways:

1. As a completed shipping paper set (insuring that no shipment would be made).

2. As a statement of the account, prepared by EDP, showing the name and address, credit limit, total outstanding against limit, itemization of outstanding items, high credit, manner of payment, and agency rating.

Information from the Accounts Receivable tape would be printed during the next daily A/R run, for other purposes.

USE OF A COMPUTER FOR CERTAIN OPERATIONS OF CLASSIFICATION

Andrew D. Booth, Birkbeck College Computational Laboratory, London
COMPUTERS AND AUTOMATION, April 1957; pages 18, 19, 37.

Two types of classification problems are discussed: frequency analysis, such as the construction of a concordance; and analysis of structures of groups of words. While both problems are fairly simple for a machine of unlimited storage, some ingenuity must be exercised in programing for a limited storage situation. The logic of such programs is given for these two types of problems.

PROJECT SQUARE PEG

ELECTRONIC WEEK, September 9, 1957; pages 12, 13.

The Air Research and Development Command has designed an electronic system for selecting qualified personnel to fill officer vacancies. Exacting descriptions of jobs and qualifications necessary for filling them were reduced to codes and recorded on IBM 650 magnetic tape memory. The personnel records of each R & D officer were put through the same routine. When the headquarters personnel officer needs to fill a vacancy, the computing system culls out a list of eligible officers with the required qualifications. Final decisions are made by the command officers.

HOW NORWICH RATE DEMANDS ARE PROCESSED BY COMPUTER

AUTOMATION PROGRESS, August 1957; pages 392, 393.

The City of Norwich in England is using a National-Elliott 405 computer with magnetic film storage and punch paper tape input and output to prepare rate demand notes ((tax bills)) and maintain ratepayers' ((taxpayers)) personal accounts. Two sets of magnetic film are used; one set contains details of all properties; the other is restricted to those where a person other than the resident is liable for the rates. Rate bills are prepared from punched paper tape output by electric typewriter. A ratebook is prepared from the updated magnetic film.

COMPUTERS ARE READY TO ROLL

ENGINEERING NEWS-RECORD, September 26, 1957; pages 21, 22.

Thirty-six states now have computers on hand or on order for use by their highway departments. Many of the remaining states are using consultants and service organizations for electronic computation service. At least 20 of the states indicated that their computer investments were beginning to pay off.

Systems Engineering

HOW FAST IS NUMERIC SORTING?

John N. Raleigh, The United States National Bank of Portland, Oregon
BANKING, October 1957; pages 46, 47.

The United States National Bank of Portland has been an outstanding example of an organization's using present equipment ingeniously to solve their data processing problems ((See DPD: May 1957, page 10)).

Here is a report of a snag which they found in their system of processing checks. Checking accounts are given account numbers, which number appears on each check. It has been expected that manual numeric sorting would be faster by 15% to 25% than manual alphabetic sorting. However, this bank discovered that the numeric system was taking at least twice as long. A solution has been found, based on suggestions by the bank's branch managers. They found that the first 15 minutes each morning were normally not very productive. Now practically the entire bank staff sets to work during this time to sort the checks. "Total man hours are higher, but using the time of day as a criterion, the sorting is now finished faster than ever before. We feel we have not been hurt by this increased sorting time. There are more than enough offsetting advantages. . . . [however] any banker contemplating a change to numeric accounting should recognize the fact that numeric sorting is slower, and should make allowances in his calculations."

General Information

PLANNING THE INTRODUCTION OF AUTOMATIC DATA PROCESSING

G. H. S. Jordan
O. & M. BULLETIN, August 1957; pages 154-160.

Readers in England will find in this article an exposition of the "Cloud 9" or "practical vs. visionary"* approach to computer feasibility studies being advocated more and more in the United States.

Five general criteria are suggested for arriving at a "decision on the practicality of introducing automatic data processing." These are: 1) The volume of work must be sufficient to justify the cost of the equipment; 2) the work must be repetitive and reasonably standardized; 3) the processing element in the job must be sufficient to

justify the cost of data conversion; 4) the procedure must be reducible in advance to step-by-step operations and judgment factors which can be expressed in numerical form; 5) limitations of visible records and access to stored information must be acceptable.

EDP demands consolidated files

The fractured files and batch operations familiar to both manual and mechanical operations cannot be tolerated in EDP. "This sort of procedure is anathema to the electronic computer. It likes to undertake every possible operation on a given piece of input data before going on to the next. The job must therefore be completely reorganized so that it is divided not by type of operation but by type of input document." The procedure must be followed through all its branches during the investigative process, ignoring existing organizational boundaries. "It is...often preferable to pay no attention to existing methods and to concentrate on determining, first, what the purpose of the job is, and second, what needs to be done in order to achieve that purpose."

Consideration should be given to using the computer as much of the time as possible. Multiple shift operation will raise problems of staffing and location which should be tackled as soon as possible. A major part of the programing should be done before delivery to avoid keeping the expensive equipment unoccupied. A warning is given that "the magnitude of the programming task is being underestimated and...inadequate staff effort is being allocated to it."

*See: DPD, July 1957, page 1 and DPD August 1957, page 14.

ELECTRONICS AT WORK

National Conference of Electric and Gas Utility Accountants, April 8, 9, 10, 1957

Seven computer installations in utility companies

A summary report was made before the National Conference of Electric and Gas Utility Accountants last April, which describes seven EDP installations among utilities. Each installation is described in terms of the applications now being handled by the computing system, the type of machine, and a brief evaluation of the application. The three large scale installations included are: Commonwealth Edison, Chicago (IBM 702); Consolidated Edison, New York (IBM 705 and Univac II); and Detroit Edison, Detroit (IBM 705, 650). Companies using medium scale computers are: Appalachian Electric Power Company (IBM 650); Cincinnati Gas and Electric (IBM 650); Columbia Gas System Service Corp. (IBM 650); Wisconsin Electric Power Co. (IBM 650).

Commonwealth Edison is using the computer for computing bills and keeping accounts, issuing records for reading meters, making periodic meter tests, answering account inquiries and producing collection notices. More than 1000 reels of tape store customer name, address, rate and metering information, and customer credit information.

Consolidated Edison uses its IBM 705 for payroll and accounting, corporate stock transfer, and materials and supplies inventory control. The Univac is being programed for customer accounting.

Detroit Edison is designing its customer accounting inventory, and employee record keeping systems for the IBM 705. The 650's are being used as interim steps in customer accounting, and for engineering purposes.

A few copies of this report are available from: Mr. A. E. Softy, Accounting Director, Edison Electric Institute, 420 Lexington Avenue, New York 17, N. Y.

PREPARING FOR PAPERWORK AUTOMATION

Ben S. Graham, Standard Register Company, Dayton, Ohio

THE JOURNAL OF INDUSTRIAL ENGINEERING, July-August, 1957; pages 217-219.

"Paperwork...is the recording, storing, analysis and reporting of information...to help someone do his job better." In view of this definition, much of our paperwork is doing just the opposite. The national average of product per clerk is $47,000. In one company which has done something about the problem, each clerical employee handles the paperwork for about $400,000 of product. The author relates his experience in surveying the top level reports of a number of companies. "Invariably this discloses duplicate or obsolete reports comprising from 10 to 30% of the total. Reports initiated years ago for a one time use have been perpetuated. Almost invariably duplicate information, systems and reports are discovered being maintained in independent, autonomous divisions or functions of the company. It is not at all uncommon for officers to not recognize reports that have been prepared exclusively for them for years."

Paperwork is not itself a control

We are reminded that "paperwork controls nothing. Paperwork will provide information to people to help them control material things." One company which investigated the cost of collecting shipping charges they had paid on materials received from vendors when the purchase was made on the basis of prepaid charges, discovered that they had spend two million dollars in collecting $200,000. Automating already wasteful paperwork only "compounds the felony." Instead, study your paperwork to get rid of waste caused by faulty systems or by lack of interest of the people caught up in dull, useless work. Second, determine the equipment or hardware needed. Third, if economic, install the hardware.

CONDUCTING A FEASIBILITY STUDY FOR INVENTORY CONTROL APPLICATION

Neal J. Dean, Ramo-Wooldridge Corporation, Los Angeles, California
Paper presented to AMA Seminar, "Applications of EDP Technique to Production and Inventory Control," March 1957.

Analytical method is longer but better in long run

"...A fully integrated electronic data processing system cannot be obtained by putting together islands of mechanization. Systems must be planned in advance in sufficient detail to accomplish the required integration." Rather, the author recommends that the company "conduct a comprehensive study of the data processing requirements of an organization." Two methods may be used for conducting such a study. In the analytical method, the company "studies in detail the functional possibilities of electronic data processing in order to assess the operational and economic advantages and disadvantages of an electronic system." The empirical method entails soliciting from several computer manufacturers proposals for application of equipment to a specific system. "The advantage of the first method is that the company has the assurance that it has explored the full possibilities of electronic data processing and has selected the best system for its needs." The author considers "the empirical approach...dangerous unless a company is sure of all the details of its application."

The feasibility study has four parts: 1. priority study, to determine where the payoff is largest and most immediate; 2. the integration study, to reduce the computer work load through relating source documents and management reports; 3. the economic study, to determine costs; 4. the operational study, to determine the machine characteristics needed for the system.

LARGE SCALE DIGITAL COMPUTERS—AN ANNOTATED BIBLIOGRAPHY

Published by Remington Rand Univac Division of Sperry Rand Corp.

Four divisions of the bibliography cover: Theory and Operation of Computers; Applications: What Large Scale Digital Computers Can Do; Some Special Subjects ((mathematics, analog computers, automation, operations research, missiles, nuclear energy, chemical processing)); A List of Periodicals.

To obtain a copy write to: Remington Rand Univac, 315 Fourth Ave., New York 10, N.Y.

Comment

NEW EQUIPMENT

The past few months have seen the announcement of several new models of equipment. This has the effect of giving the user a wider choice and making the equipment selection job more difficult. We cannot, of course, evaluate the equipment--a job that must be done in relation to your specific system; but perhaps our comments will pinpoint special features of each device.

A small scientific computer

IBM 610 Auto-point computer. This is a small computer for performing calculations (not data processing) in the Burrough's E101 class. Its principal features are:

easy decimal point (scaling) methods

selectors and balance tests on the control panel which permit conditional transfer of control within a program

eighty-four 15-digit memory cells, each of which can act as an accumulator

Delivery: 10-11 months; price: $1150/month, or $55,000 (for the basic unit, we assume).

A small data processing computer

Stewart-Warner Data Processing Machine. This is another small special-purpose computer, but designed for data processing. The principal characteristic which makes it different from theE101 and the IBM 610 is its ability tc record data magnetically on cards, and to read back such data. It uses cards which will contain up to 640 characters to store file data. In effect, this system is a super-bookkeeping machine in which the clerk does the look-up and the access to the file and the input of variable data, but the computer does all of the computation and prepares output documents.[1]

It is a general purpose machine; commands can be modified. It has typewriter input and output. Delivery: estimated 6 months (when available); price: not available (first units still under test by manufacturer).

Datatron 220. In this development a core memory is used in what was formerly a medium-speed drum system to increase its speed to near that of the large-scale class. A 2000- to 10,000-word

(i.e., up to 100,000-digit) core memory is available in the 220. Addition time is 180 microseconds. It is possible to manipulate partial words, giving the flexibility of variable word structure in a fixed word length machine. Flexibility is also increased by the ability to add to memory and to tally in any memory cell.

Variable word structure

The details of the tape and buffer system are not released yet. Tape-computer transfer rate will be 25,000 characters per second. On- or off-line high speed printing will be available, and the Cardatron and Datafile (tape bin) units can be used.

Systems for scientific applications (without magnetic tape) are to be delivered in the spring of '58; complete data processing systems in early '59. Price (for basic system): $15,000 per month or about $500,000.

IBM 705-III.* This is a major advancement in high-speed systems. The tape-computer transfer rate will be 60,000 characters per second--slightly higher than the Datamatic 1000 but attained by fewer (we hope not more critical) circuits. A core memory of up to 80,000 characters can be obtained.

Improvement in buffering is attained by merging the buffer into the memory and permitting transfer of data between tape and memory during computation. (Transfer slows down the computation somewhat.)

Programing is improved by the use of indirect (two-step) addressing and ability to manipulate bits of a character.

Tape transfer is completely independent of the computer through a flexible buffering system (as in the 709). The new 729 tape units will be used. These have the most desirable feature of reading back written records immediately to insure proper recording. A special instruction permits skipping of bad spots on tape.

Immediate read-back assures proper recording

Delivery: no quotation yet; price: $35,000 per month and up, or $1,925,000 and up.

These advancements lead one to ask what will be announced next year, and the year after that, etc. Although this is difficult even for the manufacturers to say in some cases, some comments are possible.

The principal areas where improvements are needed and there is a probability of solution, in our opinion, are these:

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* We wish a model number had been assigned which is easier to say.

What of the future?

1. Error-free magnetic tape systems. Some sort of coating for the tape appears to be under development in several places, which may reduce errors, but this problem will no doubt be with us for some time to come. Reading after recording, with ability to skip over bad spots (as in NCR 304 and IBM 705-III) is a help but not a cure.

2. Faster tape-computer transfer rates and associated flexible buffering systems. The 60,000-character-per-second rate seems to be getting near the limit of present day technology without large increases in costs. This, however, may be fast enough for some time to come. (The Magnacard system will be near 100,000 characters per second, and will have the advantage of physically separate magnetic cards.)

3. Larger memories. There appears to be a possibility of internal memories of 300,000 characters within a few years. Such a computer is being built at MIT.[2] With such a large memory, the requirements of buffers and rapid stop-start tape transports can perhaps be relaxed since the internal memory can hold a large part of the file at any one time; with only occasional transfers required to bring in another part. Large memories also permit the storage of programs with many alternatives and hence permit true one-pass consolidated file processing.

Random access memory

4. Large (billion-character) random access memory at a reasonable price. A cost of $5/month/million characters is reasonable; present prices are $40 to $200/month/million characters.[3] This kind of memory will be attained in 4 to 6 years, probably using magnetic cards; and having access times in the order of 1 second. To reduce access time to 1/10 second (as would be required for true real-time processing of a company's files) may require 5 to 10 years.

5. Command lists designed for easier programing. It probably will take several years to decide what is meant by "easier programing" and another few to realize this in equipment.

References:

1. Sisson, Roger L.; "Dreamiac," Proceedings of Second Annual Electronic Business Systems Conference, Western Division, National Machine Accountants Association, November 1956.

2. Papian, William N.; "High-Speed Computer Stores 2.5 Megabits," ELECTRONICS, October 1, 1957; pages 162-167.

3. Comment: "The Cost of Inactive Storage"; Data Processing Digest, July 1957; page 15.

WHY YOU WON'T SEE EVERY EDP ARTICLE IN DPD

Sometimes our readers look through DPD in vain for a digest of an article they have seen in a recent magazine. There are probably two reasons why an article which seems pertinent is missing from our pages.

1. It is a one-shot article in a publication which ordinarily does not include information on business uses of electronic data processing equipment.

2. It says something which has become an old, old story, or which has been covered more adequately in another publication. This is, perhaps, why many of the applications which are familiar to you are not included in DPD. One medium-size computer can process a payroll (speaking in the systems design sense) very nearly like the next.

However, sometimes a publication out of our usual area of perusal will come up with something unique or significant in the EDP field. We can only hope that some alert reader will see it and tell us about it. In addition to the 99 publications we see regularly (see DPD, October 1957, page 17 for the list) we receive numerous books, pamphlets, papers, and reports which we welcome as possible sources of high quality information for our readers.

References

The addresses of publishers and periodicals mentioned in this issue of DATA PROCESSING DIGEST are listed below for your convenience in obtaining further information about the articles or books listed.

Automation Progress
Stratford House
9 Eden Street
London N. W. 1, England

Banking
12 East 36th Street
New York 16, New York

Computers and Automation
815 Washington Street
Newtonville 60, Massachusetts

Electronic Week
19 East 62nd Street
New York 21, New York

Engineering News-Record
330 West 42nd Street
New York 36, New York

Instruments and Automation
845 Ridge Avenue
Pittsburgh, Pennsylvania

Journal of Industrial Engineering
225 North Avenue, N. W.
Atlanta, Georgia

N. A. A. Bulletin
505 Park Avenue
New York 22, New York

O. & M. Bulletin
Treasury Chambers
Great George Street
London S. W. 1, England

Systems and Procedures
4463 Penobscot Building
Detroit 26, Michigan

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Training

Electronic Data Processing for Business and Industry (Course 10), sponsored by Canning, Sisson and Associates

Date: December 2-6, 1957
Place: Chicago (Sheraton Blackstone Hotel)
Fee: $250.00
Information: Canning Sisson and Associates, 1140 South Robertson Blvd. Los Angeles 35, California

Engineering and Management Course, University of California, Los Angeles

Date: January 27--February 6, 1958
Place: Los Angeles, California
For whom: Engineers and managers, all levels
Subjects: Operations research, electronic data processing*, management decision-making, industrial engineering, etc. Twenty-five courses in all.
Cost: $350
Information: Edward P. Coleman, Coordinator, Engineering and Management Course, College of Engineering, University of California, Los Angeles 24, California

* This course is similar in content to Canning, Sisson's "Electronic Data Processing for Business and Industry."

Installing an Electronic Data Processing System (Course 20), sponsored by Canning, Sisson and Associates

Date: February 17-21, 1958
Place: Chicago (Sheraton Blackstone Hotel)
Fee: $250.00
Content: This course is a logical continuation of Course 10, Electronic Data Processing for Business and Industry. It is desirable, but not required, that attendees have taken Course 10 or its equivalent. Organization, Personnel, Physical Installation, Conversion, Operation.
Information: Canning, Sisson and Associates, 1140 South Robertson Blvd. Los Angeles 35, California

Electronic Data Processing for Business and Industry (Course 10), sponsored by Canning, Sisson and Associates

Date: April 14-18, 1958
Place: New York (Hotel Biltmore)
Fee, Information: See same course listed above

Installing an Electronic Data Processing System (Course 20), sponsored by Canning, Sisson and Associates

Date: May 12-16, 1958
Place: New York (Hotel Roosevelt)
Fee, Content, Information: See same course listed above

UNIVERSITY COURSES

Yale University, School of Engineering
Academic Year, 1957-58--I.A. 125a, Data Processing
Advanced Undergraduate course

University of Washington, College of Business Administration
Academic Year, 1957-58--344, Administrative Applications of High Speed Computers;
444, Advanced Administrative Applications of High-Speed Computers

Stanford University, Graduate School of Business
Course is offered once or twice a year, 4 hours per week for 10 weeks.
Title: Introduction to Electronic Data Processing
Course is designed for graduate students who have completed first year required courses or have instructor's consent. Course leads to MBA. For further information, write Admissions Secretary, Graduate School of Business, Stanford University, Stanford, California

SHARED PROGRAMING GROUPS

USE - next meeting: November 20-22, 1957, Dallas, Texas

SHARE - next meetings: February 26-28, 1958, Washington, D. C.
September 10-12, 1958, San Francisco, Calif.

CORRESPONDENCE COURSE IN PROGRAMING

The Electronic Computer Programming Institute, 79 Prospect Street, Stamford, Connecticut, offers a series of home study courses on the IBM 305 RAMAC, 650, and 705. Courses run from 22 to 24 lessons each, and cost $95.00 for each of four courses (the 650 has two courses, one with additional equipment). Content appears to similar in content, and cover the complete range of subjects pertinent to programing each machine.

Meetings

Eastern Joint Computer Conference--"Computers with Deadlines to Meet"

Date: December 9-12
Place: Washington, D. C. (Sheraton Park Hotel)
Information: Malcolm B. Catlin, Council for Economic and Industry Research, Inc., Arlington 2, Virginia

American Management Association Electronics Conference, and EDP Equipment Exhibit

Date: March 3-5, 1958
Place: New York (Statler Hotel)
Information: American Management Association, 1515 Broadway, Times Square, New York 36, New York

Western Joint Computer Conference

Date: May 6-9, 1958
Place: Los Angeles, California (Ambassador Hotel)
Theme: Contrasts in Computers. The last day will be devoted to Reports from the Manufacturers
Information: Dr. Willis H. Ware, General Chairman, care of Rand Corp. 1700 Main Street, Santa Monica, California

International Automation Exposition and Congress

Date: June 9-13, 1958
Place: New York (Coliseum)
Information: Richard Rimbach Associates, Show Management, 845 Ridge Avenue, Pittsburgh 12, Pennsylvania